



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) **EP 0 798 798 A3**

(12) **EUROPEAN PATENT APPLICATION**

(88) Date of publication A3:
17.03.1999 Bulletin 1999/11

(51) Int. Cl.⁶: **H01M 8/06**, C01B 3/38,
B01J 8/04, C01B 3/32,
B01J 8/02

(43) Date of publication A2:
01.10.1997 Bulletin 1997/40

(21) Application number: **97102595.2**

(22) Date of filing: **18.02.1997**

(84) Designated Contracting States:
DE FR GB

(30) Priority: **26.03.1996 JP 97469/96**
26.11.1996 JP 331455/96

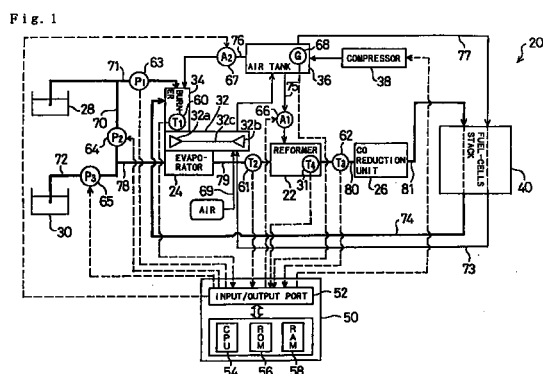
(71) Applicant:
TOYOTA JIDOSHA KABUSHIKI KAISHA
Aichi-ken 471-8571 (JP)

(72) Inventor:
Negishi, Yoshimasa,
Toyota Jidosha K. K.
Toyota-shi, Aichi-ken, 471 (JP)

(74) Representative:
Winter, Brandl, Fürniss, Hübner, Röss,
Kaiser, Polte, Kindermann
Partnerschaft
Patent- und Rechtsanwaltskanzlei
Patentanwälte, Rechtsanwalt
Alois-Steinecker-Strasse 22
85354 Freising (DE)

(54) **Method of and apparatus for reforming fuel and fuel cell system with fuel-reforming apparatus incorporated therein**

(57) Methanol supplied as a raw fuel is mixed with water, vaporized in an evaporator 24, and supplied to a reformer 22 as a raw fuel gas. The reformer 22 also receives a supply of the compressed air from an air tank 36. The raw fuel gas is mixed with the compressed air in the reformer 22. An oxidation reaction of methanol supplied as the raw fuel proceeds in the reformer 22 to generate hydrogen and carbon dioxide, while a steam reforming reaction of methanol simultaneously proceeds in the reformer 22 to generate hydrogen and carbon dioxide. The amount of heat required for the endothermic reforming reaction can be supplied by the oxidation reaction of methanol. No external heat source is accordingly required in the reformer 22 to supply the heat required for the reforming reaction.



EP 0 798 798 A3



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 97 10 2595

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	EP 0 112 613 A (ENGELHARD CORP) 4 July 1984 * page 5, line 4 - page 7, line 17 * * page 11, line 20 - page 12, line 2 * * page 13, line 14 - page 16, line 20 * * page 33, line 25 - page 37, line 2 * * claims; examples 3-8 * ---	1-17	H01M8/06 C01B3/38 B01J8/04 C01B3/32 B01J8/02
X	WO 94 26656 A (GASTEC NV ; LOOIJ FRANCINE VAN (NL); GEUS JOHN WILHELM (NL)) 24 November 1994 * page 5, line 11 - page 6, line 2 * * page 8, line 27 - page 10, line 11 * * claims * ---	1-17	
A	US 2 244 612 A (J. A. CROWLEY JR.) 3 June 1941 * claims * ---	12,14	
A	DE 26 46 129 A (GATTYS VERFAHRENSTECH) 20 April 1978 * the whole document * -----	12,15,16	TECHNICAL FIELDS SEARCHED (Int.Cl.6) C01B B01J
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 25 January 1999	Examiner Van der Poel, W
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 97 10 2595

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

25-01-1999

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0112613 A	04-07-1984	US 4844837 A	04-07-1989
		AU 572797 B	19-05-1988
		AU 1972883 A	05-04-1984
		CA 1217504 A	03-02-1987
		DK 448383 A, B,	31-03-1984
		IN 161251 A	31-10-1987
		JP 59097501 A	05-06-1984
		US 5023276 A	11-06-1991
		CA 1210242 A	26-08-1986
		US 4483691 A	20-11-1984
		CA 1210567 A	02-09-1986
		US 4863707 A	05-09-1989
		CA 1222631 A	09-06-1987
		IN 165477 A	28-10-1989
		IN 165478 A	28-10-1989
		IN 165479 A	28-10-1989
		IN 165480 A	28-10-1989
		US 4927857 A	22-05-1990
WO 9426656 A	24-11-1994	NL 9300833 A	01-12-1994
		AT 159231 T	15-11-1997
		AU 6858694 A	12-12-1994
		DE 69406311 D	20-11-1997
		DE 69406311 T	23-04-1998
		DK 738235 T	18-05-1998
		EP 0738235 A	23-10-1996
		ES 2110757 T	16-02-1998
		GR 3025614 T	31-03-1998
		JP 9502414 T	11-03-1997
		NO 954543 A	10-11-1995
		US 5714092 A	03-02-1998
US 2244612 A	03-06-1941	NONE	
DE 2646129 A	20-04-1978	NONE	